velopment, either the nucleus was found in some stage of division, or a distinct wall was present.

During the development following the stage shown in fig. 7, the tissue of the nucellus surrounding the developing sac laterally is rapidly disorganized and absorbed, so that when the embryo-sac is mature, only the apical portion and a few plerome elements of the nucellus, together with the remains of a few disorganizing cells are to be seen. Embryo-sacs in ovules near the wall of the ovary are more elongated (fig. 8) than those of centrally placed ovules (fig. 9). This is due, of course, to pressure against the wall of the ovary mainly.

The position of the antipodal cells varies here as in almost all plants. In some cases all three appeared to lie side by side, others as shown in fig. 10.

It gives me great pleasure to express my sincere thanks to Dr. Douglas H. Campbell, of the Leland Stanford University, for numerous suggestions given me in this work.—DAVID M. MOTTIER, *Indiana University, Bloomington.*

EXPLANATION OF PLATE XVIII.—Figs. 1–3, longitudinal sections of the upper part of young ovules; 1 and 1*a*, × 206; 2, × 196; 3, × 236. Fig 4, transverse section of a nucellus at the point of growth shown in fig. 3; *x* are cells derived from the initial cell, × 310. Fig. 5, longitudinal section ofthe nucellus, the nucleus of the embryo-sac, mother cell in process of division, × 236. Fig. 6, similar to 5; the devision has been completed, × 206. Fig. 6*a*, similar to the shaded part of fig. 6 with the cross wall much swollen, × 236. Fig. 6*b*, similar to 6*a* with no cross wall. Fig. 7, the lower cell has become large through growth, × 236. Fig. 8, and 9, embryo-sacs with nucellus and portion of integument cells, × 136. Fig. 10, antipodal cells of embryo-sac, × 236. Fig. 11, embryo-sac of 8, × 236.

EDITORIAL.

OUR READERS will, perhaps, remember that two years ago (July, 1890) we mentioned the undertaking of the Commissioner of Education to report the condition of biological instruction in the colleges of this country. That report, long-looked-for-come-at-last, is somewhat disappointing. It is probable that the compiler, Dr. John P. Campbell, is not to be blamed for the tardiness of its publication. But the delay in the Government Printing Office has robbed it of much of its value, for the conditions have had time to change materially since the 1889–90 catalogues, on which it is based, were issued, and we know that, in some institutions, they have been changed much for the better. For the lack of digested and tabulated information, however,

we suppose the compiler *is* responsible. A hundred pages are devoted to a detailed account of the courses in botany and zoology offered in 112 colleges. Finding difficulty in tabulating these facts, because of the large amount of electives in the better colleges, the compiler selects forty-five of those in which the courses are prescribed, makes his tables and draws his deductions largely from them! These forty-five include such as Amity, Georgetown, Iowa, Illinois, Lenox, Moore's Hill, Parsons, Scio, and Simpson colleges, and Lombard and Union universities, to rank among which Amherst, Dartmouth, Lafayette and Princeton must feel proud!

DIFFICULT AS such tabulation might be, it was in *comparisons* that the value of the report might be expected to lie. What courses are required for entrance, what courses are required before graduation, what definite courses are open to the student, and what facilities are possessed, both in the way of men and apparatus for giving these courses, ought to be clearly set forth. Had this information been put in easily available form, we might hope that those prominent institutions which are so wofully remiss in offering instruction in botany and zoology would be brought to a realizing sense of their shortcomings, and be thereby forced to a reformation. But in the chapters which discuss the school and college courses, we have only generalities. We need something more specific than a statement that "a large proportion of our colleges are really doing little more than school work in science. . . The average graduate from such a college is not prepared to conduct the simplest school course in botany." What boots it to say that "out of 111 colleges there are but forty-one in which the biological departments are in the hands of men who have no other teaching?" We want not only to know that, but which the forty-one are, and of those, which have separate professors of botany and of zoology. Why tell us that "there are not more than five or six institutions in the country that furnish students with the means of performing even the simplest experiment in either animal or vegetable physiology" if we have to look through 100 pages to find out which they are?

We recognize the difficulties in the way of presenting a bird's eye view of complicated facts; but it is far from impossible. We could have spared the quotations from various gentlemen about the value of biological training, etc., as well as the history of early biological investigations, far better than we can spare the proper digesting of the facts.

DR. CAMPBELL is, we think, inclined to ascribe too much influence to Johns Hopkins University when, speaking of it as a trainer of

teachers, he says: "Botany has, perhaps, been more influenced than zoology, as is evidenced by the fact that laboratory work is much more general than formerly, and, further, that courses in cryptogamic and physiological botany are now given in colleges where attention was formerly limited to flowering plants." Just how an institution, in which biology is a *nom de guerre* for zoology, has been so efficient in improving the instruction in botany, is not apparent, and the few institutions in which botany, not to specify cryptogamic and physiological botany, is taught, have *not* been supplied from Johns Hopkins.

CURRENT LITERATURE.

A monograph of the Fontinalaceæ.[1]

We are glad to note the publication of this work, in which M. Jules Cardot endeavors to clear up the perplexing forms of our water mosses. The contribution is all the more welcome because the group is one which has its home in our own country, for of the forty-three species of the family, no less than thirty occur in North America, of which twenty-one are endemic.

M. Cardot recognizes six genera, arranged in two tribes. The Fontinaleæ include Hydropogon, Cryptangium, Fontinalis and Wardia; the Dichelymeæ include Brachelyma and Dichelyma. The genus Fontinalis of course contains the bulk of the species. The other three of the first tribe are monotypic, Hydropogon and Cryptangium coming from tropical America, while Wardia belongs at the Cape of Good Hope. Brachelyma is revived to receive our Dichelyma subulatum, while Dichelyma consists of four species.

A notable feature of the monograph is the mode of indicating the rank of the species. They are designated as of four orders. Those of the first order have the greatest assemblage of characters by which they can be discriminated, those of the second order have a smaller assemblage of such characters, and so on. Fontinalis Neo-Mexicana, for example, is a specics of the third order, being much more poorly marked than F. antipyretica of the first order. This does away with subspecies and is much more satisfactory. Varieties are recognized as subordinate forms under species of any rank.

The full citation of synonymy, exsiccati, and geographical distribution, and the extended descriptions and remarks all combine to form

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[1] CARDOT, JULES.—Monographie des Fontinalacées. Extrait des Mémoires de la Société nationale des Sciences nat. et math. de Cherbourg, tome XXVIII. 1892. 8vo, pp. 152. Separates 6 fr. 50.